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SCIENCE

FRIDAY, OCTOBER 13, 1911

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AMERICAN VETERINARY EDUCATION AND ITS PROBLEMS¹

IN analyzing the subject assigned as my part of the committee's report, I became deeply impressed with the responsibility that rests upon those who are in a measure charged with the difficult task of molding a system of education for these great countries that will yield efficient veterinary service. The first generation of veterinary educators in America is rapidly passing away. Its efforts were spent in meeting the demands and grappling with the conditions of a new country and there was little time for it to reckon with the educational methods as they had developed in more mature and cultured Europe. While this first generation manfully battled against the onslaught of disease in the rapidly increasing animal population, discoveries were being made, and methods tested and put into operation, pertaining to veterinary education and practise, of which these new countries were unmindful. At no time in the history of man has a generation witnessed greater revolutions in the theories, facts and methods of a profession than those which occurred in rapid succession in the active lifetime of Alexander Liautard, Andrew Smith, Duncan McEachran and James Law, three of whom still remain as wise counselors among us. These distinguished men have witnessed all that has been accomplished in the acquisition of definite knowledge of specific diseases, sanitary science, the introduction of the newer

MSS. intended for publication and books, etc., intended for review should be sent to the Editor of SCIENCE, Garrison-on-Hudson, N. Y.

¹A paper presented by the chairman of the Committee on Intelligence and Education of the American Veterinary Medical Association, at its annual meeting, Toronto, August, 1911.

pathology and therapeutics and the development of our veterinary schools and colleges. It is well for us of the present to recognize that these great leaders saw, as did Lowell, that "New times demand new manners and new men and new conditions demand new schools." Law was the first to carry this idea into practise. Smith followed by affiliating with a great university the school brought into form by his own efforts. McEachran, finding it impossible to provide adequate equipment with the financial support forthcoming, closed the doors of his institution, and Liautard is constantly ringing the call for better and more efficient education.

Standing as it were at the close of the first generation and at the beginning of the second, it seems fitting that this association should devote a little time to the consideration of veterinary education in these countries—what it is, its weaknesses, its strength, its opportunities and above all its responsibilities.

It is a reasonable hypothesis that education directed toward the preparation of men for the practise of veterinary medicine does not differ in principle from that for other professions. The laws of educational evolution therefore apply here as elsewhere, and the acquisition of knowledge that goes to make up a so-called learned profession holds exactly the same position here as it does in human medicine, theology or law. The purpose of education is to engender thought, to eliminate dogma, to enthrone facts and laws and to endow one with an intellectual liberty. Accompanying the possession of definite knowledge there is a corresponding moral obligation to use this knowledge for the benefit of mankind. This is especially true with the medical professions.

If one analyzes the present status of veterinary education in America, measured

by the course of general educational laws, it will be found that there still remain in our system or systems of instruction many examples of the methods of the unskilled, remnants of faith in the magic power of the by-gone mystic wand, lingering beliefs in the technical ability of the so-called practical man, as well as a powerful undercurrent of forces demanding education for efficiency. This demand for better training must eventually here, as in other fields, cause ignorance to be replaced by knowledge, unfounded opinions to give way to facts and finally banish forever that error in our teaching which assumes that application can go ahead of the knowledge to be applied. We hear much of veterinary science, forgetting that the application of veterinary medicine is an art based upon a well-defined group of sciences, and that, other things being equal, the success of the artist depends upon his knowledge of the sciences upon which the art rests. This is illustrated by the universal fact that in those countries where the most training in the basic sciences is given and demanded practise is correspondingly most successful. In our systems too much emphasis has been and still is placed upon the diploma and all too little upon what it should represent, thus encouraging the erroneous assumption that it is possible to use what one does not possess.

In order to estimate the true worth of our systems of veterinary education, let us in our imagination strike from our knowledge and from the literature the achievements of the devotees of pure science and then ask ourselves what American veterinary education in itself has done to advance specific knowledge of the nature, treatment and prevention of animal diseases. The honest answer to this question would show that much we are wont to claim for our humane profession comes to

us as a heritage from the great leaders in chemistry, physiology and pathology. The analyst finds in many of our systems the presumptuous effort to correlate the basic sciences into a workable unit in men who do not possess the first principles of chemistry, physics and biology and to instruct such undisciplined men in the many complicated topics that must find place in a modern veterinary curriculum in the brief period of a few short months. While perhaps in earlier years, before there were public schools, and when our curricula were less crowded, these methods met the requirements, the time has come when they remind one of the legend of the clock. It is said that in one of the old towers of Europe there was a clock. As time went on the hands dropped off and the figures on the dial became obliterated; but the sexton, grown old in service, ascended the ladder every week and wound the slowly rusting spring and the clock kept ticking, ticking, while all those who came to learn the time of day went away disappointed, for it told them nothing. A like experience, as proved by many statements from agriculturists, is all too often recorded by those who, in trying to save their suffering animals, have witnessed the hopeless efforts of men who have mistaken diplomas for knowledge and who have sought to be practical without possessing the knowledge with which to aid the sick individual to set aright the disharmonies in the physical body.

Although it is easier to tear down than to build up, it is not my purpose to dwell upon the things we wish were not, but rather to point to the broad foundations that have been and are being laid and to the towers of strength and service that sooner or later must rise upon these foundations. The first and most important stone that is being placed in the foundation

for a better and more efficient veterinary education is the training of the owners of animals in the basic sciences upon which veterinary art itself is founded. The teaching in chemistry, botany, physiology and bacteriology given in our agricultural colleges is removing from the minds of men the mask concerning the nature of disease and its treatment that superstition has long held in place. The truth uttered by John Hunter centuries ago that diseases should be studied as objects of natural history has been accepted. It is now recognized that when there is a disability of the body or a morbid process there is some physical cause; and that the remedy lies in rendering the inflicted individual some definite assistance to the methods nature herself has provided to defend the body against such irritants, whatever they are, or to heal the injuries produced. The principles of immunity as laid down and demonstrated by Metchnikoff and Ehrlich are being outlined in readers for pupils in the common schools. The U. S. Bureau of Animal Industry, experiment stations and agricultural colleges are popularizing technical knowledge and sending it broadcast throughout the country in bulletins and circulars so that those who escape the college curriculum are caught in the coils of these popular mechanisms for instruction. With a clientele versed in the very sciences that must be applied by the veterinarian, can a practitioner hope for success, or even for a chance of success, if he himself is not in possession of a still greater knowledge of these same subjects?

A second stratum in our foundation is the gradual differentiation of a group of sciences and their special development for the purpose of promoting the practise of veterinary medicine. Until recently, and in certain places, this still obtains, there has been the tendency to instruct students of

agriculture and others in the treatment of animal diseases. "Every man his own veterinarian" has been the slogan of many, and because of the scarcity of properly trained practitioners it seemed for a time to be the only source of relief. Gradually the line of demarcation is appearing between the general scientific knowledge of the layman and that required for the successful practise of veterinary medicine. Further, as people become versed in the biological sciences, they are better qualified to judge of scientific work; but nowhere in general education are men trained in the details of fact and physical law necessary to wrestle with the diagnosis and treatment of animal diseases. The holding up of a professional standard is more and more in evidence. The aphorism that "the treatment of a disease should not be given to a man who can not make the diagnosis" is prevailing more than ever before, and with it great suffering to dumb creation is being avoided.

Nowhere in educational extension work is there more danger than in the effort to popularize knowledge which can not be popularized. Some years since I was asked to prepare an article for a great agricultural encyclopedia on the treatment of all of the diseases of animals. My reply was that I could not do it for two reasons, first, I did not possess the necessary knowledge and, secondly, I would not if I could. Whatever our duties may be, they certainly do not lead us into acts that will encourage uninformed people to interfere with the natural resisting and healing forces of the physical body by the improper application of drugs. As sacred as the Hippocratic oath is the therapeutic axiom, "If we do no good be sure we do no harm." The assumption that a diagnosis can be made by any intelligent individual and that he can apply remedies with hope of

success is no longer entertained. The recognition of the line of cleavage between knowledge that can be imparted to and used by the layman and that which can be used effectively only with the full complement of facts which are possessed by the properly trained professional man, is a signal for still better and more lasting achievements.

A third element of strength is the recognition by the existing veterinary schools and colleges that better and more efficient work is demanded of them. Already there is a wide-spread effort to bring about better conditions. As the foundation for a better system of veterinary education has been laid by forces operating largely outside of the profession, it remains for us to build upon this foundation an educational structure adequate to the demands. Many efforts of a more or less spasmodic nature have been put forth to accomplish this. Numerous formulæ have been proposed for the conduct of veterinary schools and colleges. While opinions may differ as to the effectiveness of the various remedies proposed, we may with fairness to all pass from a prescribed formula to the facts and principles that must be reckoned with in securing the desired results. Here we do not differ from human medicine, engineering, agriculture or specialization in any of the sciences. The facts to be considered pertain to the changes in curriculum, methods of teaching and the necessary cost of instruction. The underlying principle is that which governs the growth of knowledge and the discipline of the individual acquiring it.

In former times students acquired their professional knowledge from their preceptors. Later this system obtained in schools where the master in the form of didactic lectures given with more or less ceremony imparted facts considered to be sufficient

for the practitioner. A time came, however, when many discoveries in nature's processes were made and great leaders arose. Those leaders precipitated, as it were, long suspended and hitherto unperceived elements of knowledge so that orderly truth seemed to crystallize in the twinkling of an eye out of what had appeared hitherto but a cloudy mass of facts. Men of this class are not born in every generation; in none are they numerous. Theirs are the master minds. In a strict sense these men are pupils of no masters, but at first they stand alone in expounding new theories. Such men as Virchow, Darwin, Pasteur, Metchnikoff and Ehrlich laid the foundation of rational medicine and brought into the curriculum the consideration of a vast number of topics unknown to their predecessors. These subjects could not be taught by word of mouth only, and consequently laboratories with delicate and expensive apparatus supplemented lectures, and clinics with a great array of instruments of precision were substituted for cases in private practise. Again, to understand the meaning and to profit by these aids the student must be prepared by a training in and a knowledge of the basic sciences. These changes have come about in less than a half century and the lives of men now living span this great epoch-making period.

With the introduction of new subjects and new methods of teaching, the cost of instruction increased. The schools without the equipment can not meet their obligations, nor can they procure the equipment and provide the instruction with the fees that students pay. This is an important fact in higher and professional education everywhere. Many elements enter into this increased cost, the most important of which are expensive equipment and the inability to teach large classes or sections

of students and the consequent necessity of providing for units of small numbers. The budgets of our large universities show that it actually costs for every student from two to three times as much as the highest tuition charged, and when the maximum efficiency is attained the expense will be much greater than at present. Recently the president of one of our best technical universities told me that it cost them \$450 a year for every man they graduated. It costs our best medical schools from \$500 to \$1,000 and some of them more a year for every student, and no thoughtful person will assert that efficient veterinary education will cost much if any less. The college which I have the honor to represent expends over \$300 annually for every student in addition to the cost of instruction in histology, embryology, chemistry and animal husbandry given by the university, and even with this outlay my heart and head are sorely troubled to satisfy the reasonable demands of the faculty for assistance and equipment with the funds available.

The difficulties involve not only questions of financial support, but also efficient methods for teaching the newer subjects. It often seems that in the development of efficient educational systems the greatest difficulty is the formulation of methods and the enlistment of suitable men for teachers. Some years ago I accepted a position carrying with it the responsibility of teaching pathology and bacteriology in a veterinary college. I went from a research laboratory where I had grown up with the technique and knowledge of certain phases of the subjects. I labored, as have many others, under the delusion that the essential elements could be easily taught. There was no difficulty in securing the interest of the students, but the pangs of disappointment were mine when these same interested men

attempted to apply the knowledge I supposed they possessed, in the actual practise of their profession. Their errors were not more grievous than those of other men, but the things they did and the kind of assistance they sought pointed clearly to a lack of knowledge or understanding at least of the subjects which I believed I had taught with great clearness. This experience has caused me to question the efficiency of many pedagogical methods and to test as best I could different systems of instruction in my own department. The conclusion that seems to be inevitable from the experience of the past is that for the best results the courses in a veterinary curriculum must be dominated by a scientific system of presentation and that the technique, facts and laws of chemistry, anatomy, physiology, bacteriology, pathology, medicine and surgery must be clearly developed before stress can be placed upon the value of fragmentary facts. The difficulty rests not alone in a lack of the knowledge of technique, but quite as much in the inability to apply the principles and to interpret the findings. If veterinary medicine is to benefit the public as it should, it is important that those responsible for the training of men who are to apply the knowledge in practise take fully into account the nature of their teaching. Wherever the true scientific spirit dominates the final results prove to be most helpful. It is not my purpose, nor do I believe it is possible, to outline a schedule to be followed by all. It is, however, within our power to give to veterinary medicine the dignity commensurate with its economic and vital relations to the live-stock interests of the country and to teach it as a group of correlated sciences and not as an aggregation of disconnected facts.

During the last quarter of a century a great revolution has taken place in matters

educational, and the period of readjustment is upon us. The problem as presented to us by the rapid bursting forth of enormous numbers of facts and new methods is easily stated. How can young men be fitted for their profession for \$125 a year when it actually costs from three to four times as much to provide the necessary instruction? This is a problem that almost chills our enthusiasm. It is so sudden, so contrary to precedent, so unreasonable from our accustomed point of view, that there is an inclination to dispute it. However, as science can not rise above natural law but must work through it, so veterinary education can not depart from the laws that govern higher education, but must follow them. If the veterinary profession attains its rightful place among the learned professions it must, like the others, adjust itself to the requirements of the times. We are engaged in professional work, not selfish enterprise. The same problem confronts human medicine, and our deliverance is equally as hopeful as that of the sister profession.

Those who have sought for a remedy have found but two solutions to the perplexing problem, namely, the endowment of our schools, either directly or by affiliation with universities or by state assistance. In the United States and Canada private endowments for veterinary schools are not numerous. If the wealthy are not disposed to aid this cause, why can not the members of the profession itself form active alumni associations for the purpose of raising funds to make it possible for their own schools to obtain the necessary financial support? Such a scheme is already in operation in several of our largest universities, and I see no reason why it should not work with veterinary colleges. So long as satisfactory technical education can not be obtained for the fees which most stu-

dents can pay, it is fair that, after receiving the benefit of such training, the alumni should respond willingly and generously. Because such an education is expensive, and because through the wisdom and generosity of certain people provision has been made that boys with little or no money can obtain it, there is no reason why the recipients should not repay the institution for what they have already received.

On the continent of Europe government control has long since solved this difficulty. In America the states and governments are beginning to recognize their responsibility in this matter, but nowhere to the extent the work demands. However, the sentiment is right, and our legislators are waiting for veterinarians to point out the needs, and indicate the course to be followed. I do not know of any line of educational effort that has been more effective in bringing to its aid state assistance than the veterinary cause. There is every reason to expect that when the veterinary profession shows the owners of the more than \$4,000,000,000 worth of live stock in the United States alone what can be done to save annually the millions of loss from disease, and when we demonstrate to the health authorities and the public the sanitary importance of a veterinary training, this profession will receive its just recognition. The opportunities for the veterinarian to serve the people are so great that when the profession fully meets its responsibilities, and when leaders appear to solve the problems still waiting solution, veterinary education will become the most idealistic and realistic of the learned professions, and the funds necessary to provide such service will be forthcoming. The need of the time is educational leaders to formulate systems and to develop the many avenues through which we can render service to our clients, our state and our nation. As devotees of

veterinary science we yield precedence to none in honesty and lawfulness of purpose or faithfulness of service in the bitter conflict humanity has ever waged and ever must wage against pain and disease.

As already stated, our difficulties are not restricted to finances. There are perplexing pedagogical tasks before us. In every transition period there are dangers often overlooked until it is too late. Medical instruction and practise are changing. The new theories, diagnostic aids and therapeutic agents fairly glisten with possible victories. The recent graduates going out with this new armor are like the unhappy knights of old in the search for the Holy Grail in that they feel their zeal and power to be sufficient to overcome all obstacles. The pendulum of knowledge, like that which beats time, swings from one extreme to the other. Specific knowledge of etiology, the reaction of the tissues, the definite laboratory methods for diagnosis, are accompanied by dangers, for as yet we see only in part. Already the experience with tuberculin, the agglutination test and the reliance on certain findings in blood examinations, point to the fact, which must not be overlooked, that in all of the so-called methods of precision there are sharply defined limitations which sooner or later will be revealed. Again there is in evidence the danger of superficial training in the practical branches, such as theory and practise, because of a dependence on and an over-confidence in laboratory findings or the newer remedies. All too frequently we receive at our laboratory a piece of hide, a bit of intestine or a smear from a liver, sent that we may diagnose the disease from which the animal died. In rare instances this can be done, but it should be clearly understood that the only thing laboratory methods can do is to enable one to see deeper into the condition

than he otherwise could. If the trouble is in the bone, the nervous system or the kidney, a piece of the stomach usually tells us nothing. The microscope or the culture tube can show us only what is present and for assistance they must be used in conjunction with other information or to verify or refute suspicion. This means, therefore, that men who are to become practitioners must be trained in the knowledge of specific etiology, the newer pathology and therapeutics, *in addition to and not as a substitute* for the training in thorough systems of physical examination and in close observation of signs and symptoms in diagnosis and treatment. This not only increases the responsibilities of our teachers, but also demands that technical professional knowledge shall be grafted upon well-trained and noble men. There is no other profession where accuracy, correct interpretation and application are of greater significance than they are in this, yet there is no other where men are elevated to positions of responsibility with so little real preparation. We seem to have forgotten that in the acquisition of knowledge and the coming into an understanding of a profession, the element of time and the discipline of routine work and research are as essential as they are in a science like chemistry or physics.

I have dwelt somewhat at length upon the difficulties in bringing into action men who will meet the demands, improve the opportunities and fulfill the responsibilities of the veterinary profession. If these difficulties are analyzed, it will be found that they are temporary and incident to the transition stage of our knowledge, methods of instruction and the newer conception of the important work of the veterinarian. These all point clearly to the opportunity for veterinary service equal to that of any other occupation or profession. The

watchword of to-day is the prevention of disease quite as much as its cure and when this dual purpose becomes fully recognized the necessary means will be forthcoming. While there is much to be accomplished, while our problems are difficult and our burdens sometimes seem greater than we can bear, my voice has proved a recreant servant if any tones of doubt, or fear of ultimate victory, have marred this discussion. There are many reasons to believe that the time will soon come when there will be an American system of veterinary education, laws and practise that will take first place in the world-wide effort to secure the highest possible efficiency in veterinary service.

VERANUS A. MOORE

THE BRITISH ASSOCIATION FOR THE
ADVANCEMENT OF SCIENCE
ADDRESS TO THE BOTANICAL SECTION¹

GREATLY as I prize the honor done me by the Council of the British Association in electing me to the office of President of the Botanical Section, my gratification has been heightened by the knowledge that the meetings of this section would be graced by the presence of the distinguished group of Continental and American botanists who have just taken part in the International Phytogeographical Excursion to the British Isles.

I am sure that I am voicing the unanimous feeling of the section in offering them a hearty welcome to our deliberations, and, in conveying to them our sense of the honor they have done us by their acceptance of the invitation of this association, I would like to express our hope that by their participation in our proceedings they will help us to promote the advancement of botanical science, for which purpose we are met together.

¹ Portsmouth, 1911.